

(12) UK Patent Application (19) GB (11) 2 274 251 (13) A

(43) Date of A Publication 20.07.1994

(21) Application No 9300671.6

(22) Date of Filing 15.01.1993

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(51) INT CL⁵

B01D 17/02 17/12, F02M 37/22

(52) UK CL (Edition M)

B1D DPEC

G1H H2A

U1S S1270 S1359 S1883 S1990

(56) Documents Cited

GB 2155767 A

GB 2003723 A

GB 1392280 A

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(58) Field of Search

UK CL (Edition M) B1D DNRE DPBE DPCA DPEA DPEC

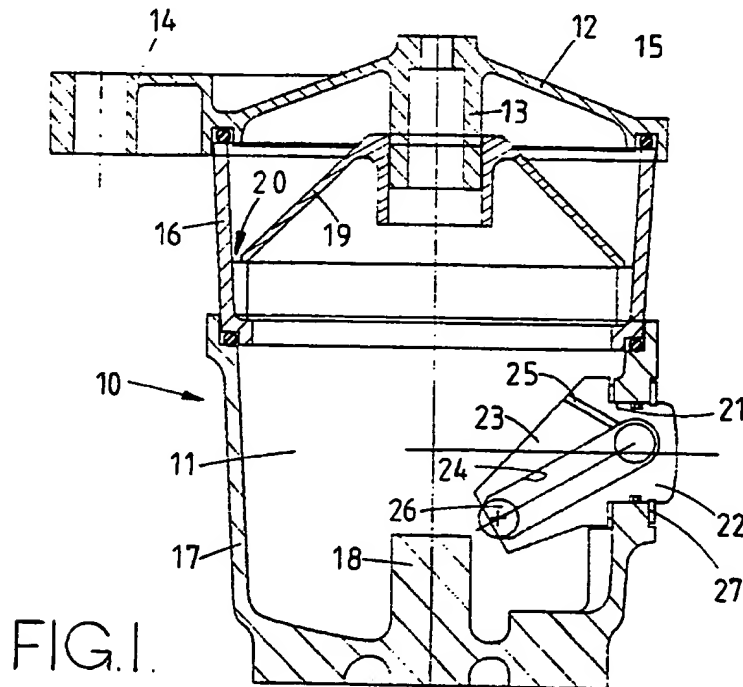
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INT CL⁵ B01D 17/02, F02M 37/22

ONLINE DATABASE:WPI

(54) Settling device

(57) A settling device for incorporation in a fuel system of an internal combustion engine includes a multi part housing (12, 16, 17) which defines a closed chamber (11) in which water entrained in the liquid fuel can collect. A float 26 floats on the water-fuel interface and is visible through a transparent window to indicate accumulation of water. In Fig. 1 float 26 is captive in an inclined passage 24 is a transparent block 22, 23. Fig. 2 is similar, but the passage is vertical. In Fig. 3 the top of an elongate float becomes visible under a transparent dome at the top of the device. In Fig. 4 a float is visible behind a side window. In Fig. 5 the float is pivotally mounted and rotates as water level rises.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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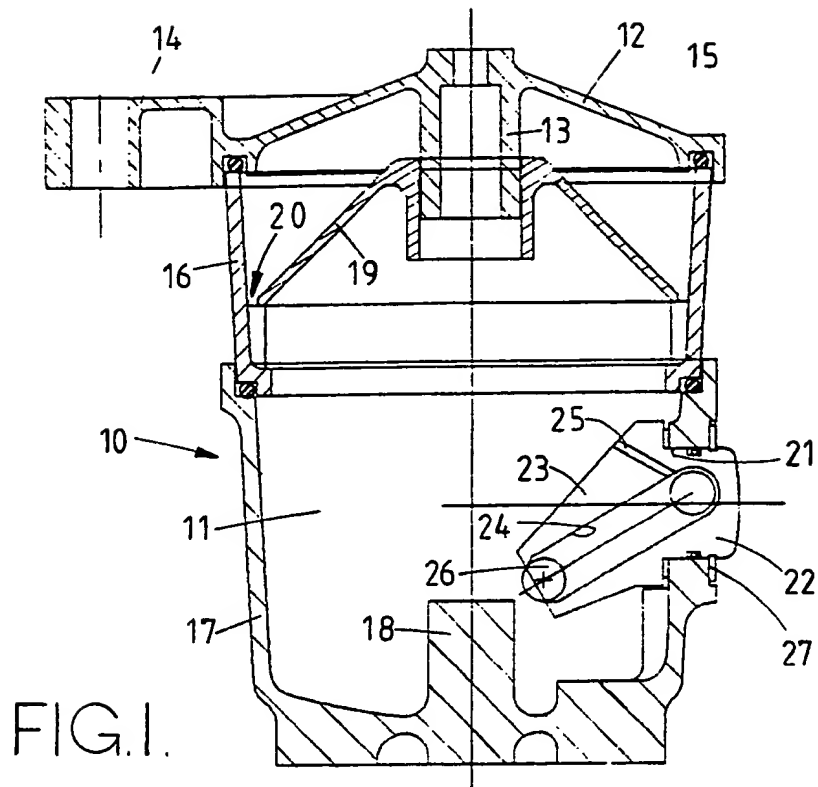
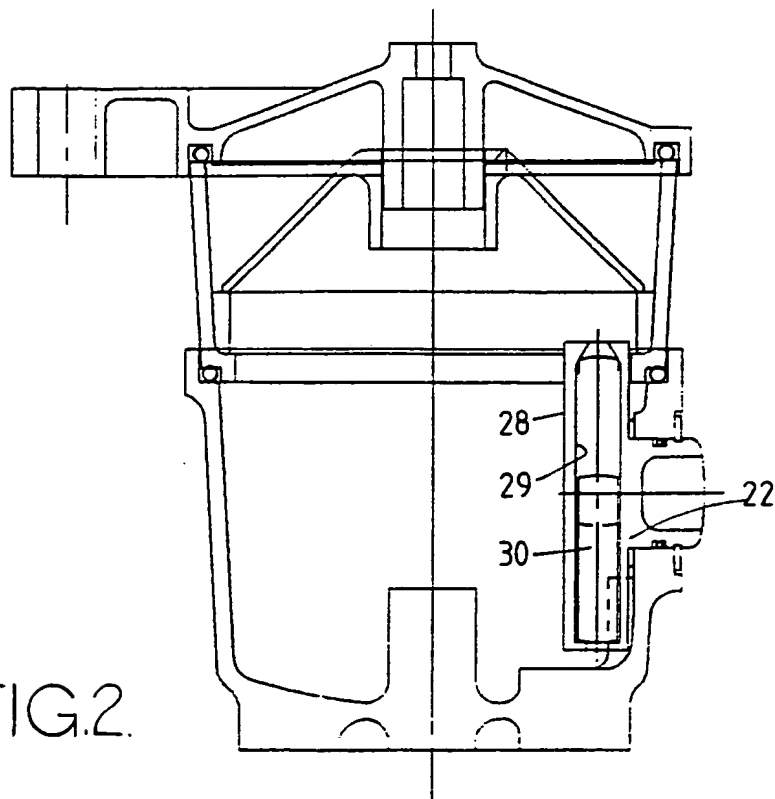
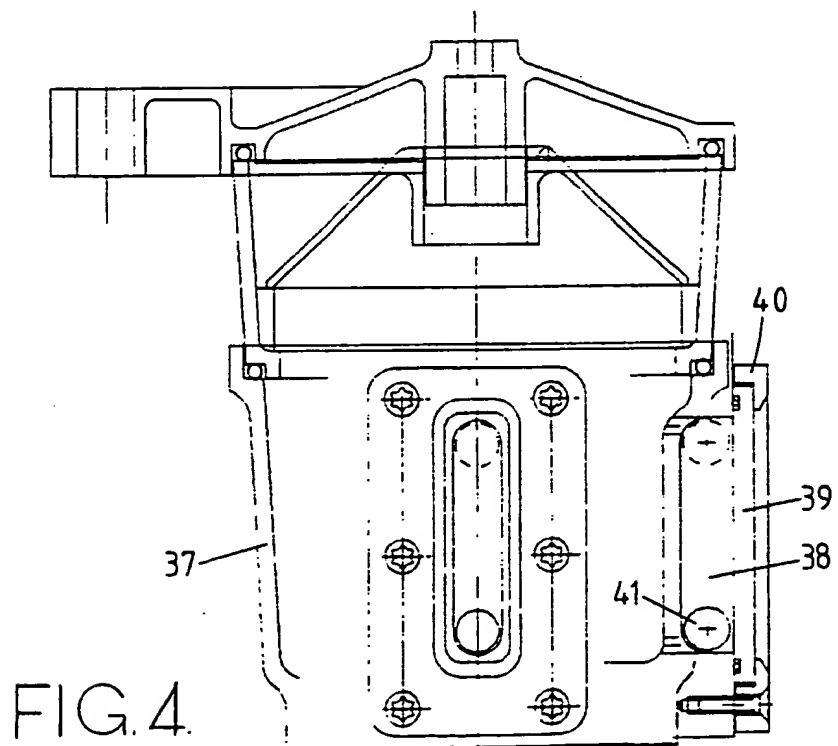
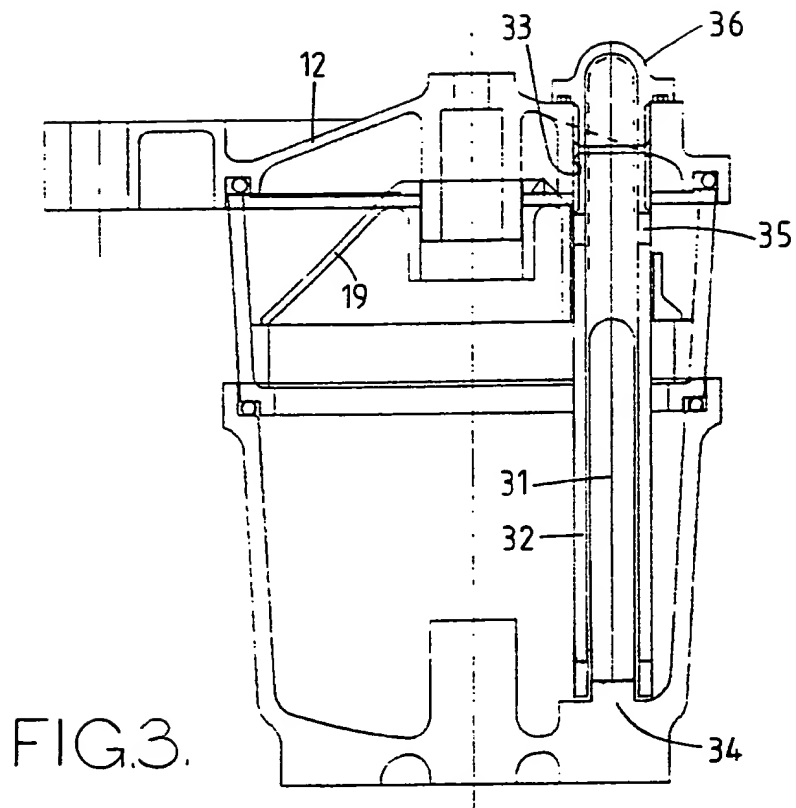


FIG. 2.





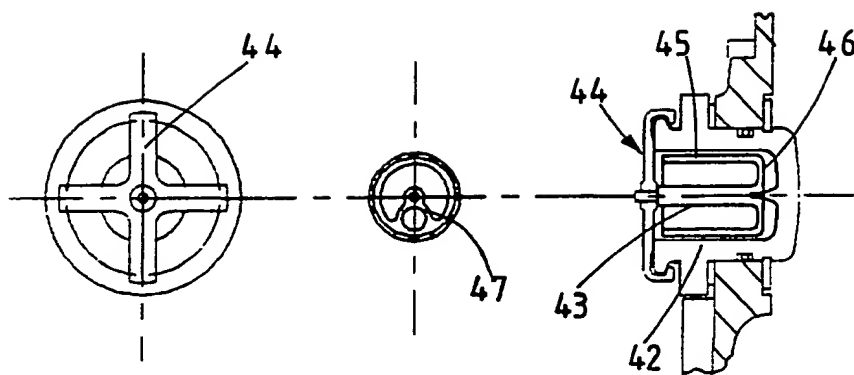


FIG. 5.

SEDIMENTATION DEVICE

This invention relates to a sedimentation device for incorporation in the fuel system of an internal combustion engine, the device comprising a housing in which is defined a sedimentation chamber, a liquid fuel inlet to the chamber and a liquid fuel outlet from the chamber, at least the outlet extending from an upper portion of the chamber, the arrangement being such that in use water entrained with the liquid fuel will collect in the chamber.

Such sedimentation devices are widely used in fuel systems for compression ignition engines and are usually located in the fuel supply system intermediate the fuel tank and a low pressure pump. A paper filter element is also provided in the supply system and is located downstream of the sedimentation device either before or after the low pressure pump depending on the type of pump. The sedimentation device acts to retain most of the water and also large particles of dirt which are in suspension in the fuel drawn from the fuel tank. It is most important to drain the water from the chamber before it reaches a level at which there is a possibility of it being drawn through the outlet. Since the quality of the fuel is variable it is necessary to ensure that the level of water in the chamber can be determined quickly and it has been the practice to form part of the housing from transparent material such as glass or plastics. The former is brittle creating potential operator hazards and the latter tend to have reduced mechanical strength at elevated temperatures and in the presence of some types of fuel.

It has been proposed to provide an electrical sensor in the housing but the sensor and the associated circuits are expensive and require the provision of an electric

supply.

The object of the present invention is to provide a sedimentation device of the kind specified in a simple and convenient form.

According to the invention a sedimentation device of the kind specified comprises a float member located in the chamber, said float member being such that it will respond to the rising level of water in said chamber, the chamber having a transparent window through which said float member or a part associated therewith can be observed.

Examples of sedimentation device in accordance with the invention will now be described with reference to the accompanying drawings in which:-

Figures 1-4 show sectional side elevations of four examples of the device, and

Figure 5 shows a modification of the device seen in Figure 1.

Referring to Figure 1 of the drawings the device comprises a multi-part housing 10 in which is defined a chamber 11. The housing comprises an upper mounting part 12 which defines a hollow central boss 13 extending downwardly into the chamber. The mounting part is provided with a lug 14 to enable it to be secured to a support and the undersurface is formed with an annular recess 15. The hollow boss 13 extends above the upper surface of the mounting part to define a location for a securing bolt (not shown). A fuel outlet passage extends from the interior of the boss 13 and at a position disposed intermediate the boss and the recess there is provided a fuel inlet (not shown). The fuel inlet in use

is connected by way of a pipeline to the fuel tank and the fuel outlet is connected to the inlet of a fuel pump either directly or indirectly through a paper filter element.

Within the recess is located an annular seal member which establishes a seal with the rim of an annular intermediate portion 16 of the housing. At its lower end the intermediate portion is stepped inwardly to define with a generally cup shaped base portion 17, a further annular recess for a further seal member. The base portion 17 is provided with a central boss 18 in which is formed a screw-threaded blind hole which receives the securing bolt whereby the three components of the housing are held in assembled relationship.

Mounted about the boss 13 is a hollow truncated conical sedimentation element 19 which extends outwardly and downwardly from the boss towards the internal surface of the annular intermediate portion 16. An annular gap 20 is defined between the rim of the element 19 and the internal surface of the intermediate portion and in use, fuel flowing through the inlet flows downwardly through the gap 20 with the element 19 acting as a diffuser. The fuel then tends to flow radially towards the central portion of the lower portion of the chamber and then upwardly through an annular space defined between the securing bolt and the internal surface of the boss and through the outlet. Droplets of water and heavy particles of contaminant tend to fall under the action of gravity to the bottom of the chamber. The water and dirt collecting in the chamber can be drained from the chamber by means of a vent (not shown).

In order to be able to assess the level of water in the lower portion of the chamber 11 there is provided in the side wall of the base portion 17 of the housing, a

circular opening 21. Located in the opening is a complementarily shaped insert 22 formed from transparent material. The insert is provided with an integral extension 23 in which is defined an inclined bore 24 which is open at its lower end. The upper and closed end of the bore terminates within the insert and an outwardly extending passage 25 extends from the closed end of the bore into the chamber 11. Moveable within the bore is a float member in the form of a ball 26. The float member is formed from a material which will float on the interface of the water and fuel and is preferably coloured so as to be readily visible when it reaches the upper end of the bore 24 as the level of water rises.

The ball is prevented from falling from the lower end of the bore by deformation of the material forming the extension and the insert and extension are retained within the opening by means of a circlip 27. A lug is formed on the wall of the base portion to restrain the extension against rotation.

In the arrangement shown in Figure 2 the extension 28 is of generally cylindrical form and the bore 29 formed therein extends vertically. The float member 30 is of elongated form and conveniently is just over half the length of the bore. The upper end of the bore is partly closed by deformation of the material forming the extension and the lower end of the bore is open to the chamber by way of an opening.

A different arrangement is seen in Figure 3 in which an elongated float member 31 is housed in a tubular member 32 which is provided with a screw-threaded upper end portion which is secured in the lower portion of a screw-threaded opening 33 formed in the mounting part 12. The member 32 extends with a very small clearance through an opening in the sedimentation element 19 and at its lower

end is slotted and is engaged about a projection 34 on the base portion of the housing. Adjacent the opening 33 the member 32 is provided with a pair of openings 35 so that fuel can be displaced from the upper end of the bore in the member as the float member rises therein. The opening 33 is closed by a hollow dome shaped insert 36 formed from transparent material which is screwed into the opening and the shape of the insert is such that when the water level in the chamber reaches the level at which it is thought desirable to open the drain, the float member will lie within the insert and therefore will be visible from the exterior of the sedimentation device.

In the arrangement of Figure 4 the side wall of the base portion 37 of the housing is shaped to define an elongated recess 38 in the exterior surface. The recess is vertically disposed and is in communication at its upper and lower ends with the chamber. The recess is closed by a transparent window 39 which is held in sealing engagement with the side wall of the housing by a frame 40. A float member in the form of a ball is located in the recess. It will be appreciated that Figure 4 shows the indicator in both sectional side elevation and also front elevation.

In the arrangements described the float member floats freely in the passage or recess in which it is located. In the modification shown in Figure 5 a hollow cup shaped insert 42 formed from transparent material is located in the side wall of the base portion of the housing. The inner surface of the base wall of the insert is shaped to define a pivot for a hollow annular float member which is formed from material with "float" at the interface of the water and fuel. The float member has a central stem 43 which at one end has a recess to locate the pivot and at its other end is of reduced diameter to define a pivot pin which is supported for rotation in a support frame 44

clipped to the open end of the insert. The annular wall 45 of the float member is connected to the central stem 43 by an end wall and also by a spoke 47 which extends between the central stem and the inner surface of the annular wall. As seen in the central view of Figure 5 the spoke is hollow but the weight of the spoke is sufficient to cause the float member to assume the position shown in Figure 5 when it is immersed in fuel. As the level of water in the chamber rises the portion of the float member defined by the spoke will float on the interface of the water and fuel and will therefore cause rotation of the float member and the altered position of the float member will be visible from the exterior of the sedimentation device.

The float member may be formed from a material which is of increased density such that it will not float on the interface of the fuel and water. In this case the hole in the spoke may be filled with a suitably less dense material or the open end or ends of the hole sealed so that neither fuel nor water can enter the hole.

In the examples described the components of the housing are formed from metal and the transparent portions can be made of sufficient thickness to have an adequate strength even at elevated temperatures and with the various types of fuel which are available.

CLAIMS

1. A sedimentation device for incorporation in the fuel system of an internal combustion engine comprising a housing in which is defined a sedimentation chamber, a liquid fuel inlet to the chamber and a liquid fuel outlet from the chamber, at least the outlet extending from an upper portion of the chamber, the arrangement being such that in use water entrained in the liquid fuel will collect in the chamber, the device further comprising a float member located in the chamber, said float member being such that it will respond to the rising level of water in said chamber, the chamber having a transparent window through which said float member or a part associated therewith can be observed.
2. A device according to Claim 1, in which said float member is located in a bore which is formed in an extension integral with an insert which defines said window.
3. A device according to Claim 1, in which said float member is movable about an axis in response to the rising level of the water in the chamber.
4. A device according to Claim 1, in which the float member is located in a tubular member extending within the chamber and secured at one end in an upper wall of the chamber, said transparent window being defined by an insert which is secured in an opening in said upper wall.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
 GB 9300671.6

Relevant Technical Fields

(i) UK Cl (Ed.M) B1D (DNRE, DPBE, DPCA, DPEA, DPEC,
 DPFA, DPMX)

(ii) Int Cl (Ed.5) B01D 17/02; F02M 37/22

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASE: WPI

Search Examiner
 R T HAINES

Date of completion of Search
 11 FEBRUARY 1994

Documents considered relevant
 following a search in respect of
 Claims :-
 1-4

Categories of documents

- | | |
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| <p>X: Document indicating lack of novelty or of inventive step.</p> <p>Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p>A: Document indicating technological background and/or state of the art.</p> | <p>P: Document published on or after the declared priority date but before the filing date of the present application.</p> <p>E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p>&: Member of the same patent family; corresponding document.</p> |
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Category	Identity of document and relevant passages		Relevant to claim(s)
Y	GB 2155767 A	(HADEN)	2
Y	GB 2003723 A	(RESEARCH INVENTIONS LICENCES LA)	4
X,Y	GB 1392280	(THOMAS)	X: 1 Y: 2, 4
X,Y	GB 1227427	(MATSUSHITA)	X: 1 Y: 2, 4
X	GB 0199036	(S A DES APPAREILS)	1

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